

Xpedition

STUDENT INVESTIGATIONS





From Kilimanjaro to our own Backyards

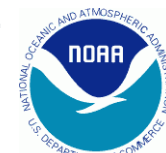
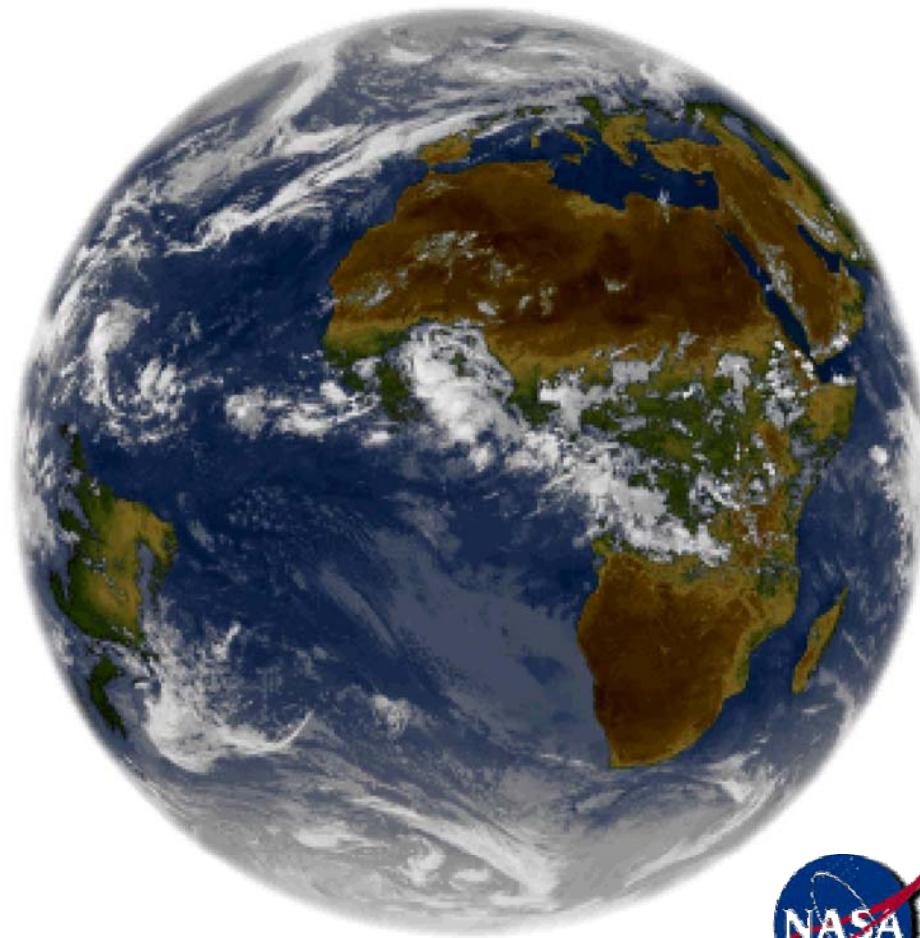
Michael O'Toole
March 10, 2011





The **GLOBE** Program

**Partnering Students, Teachers and Scientists
to gain a better understanding of our planet**



GLOBE Around the World



111 GLOBE Partner Countries

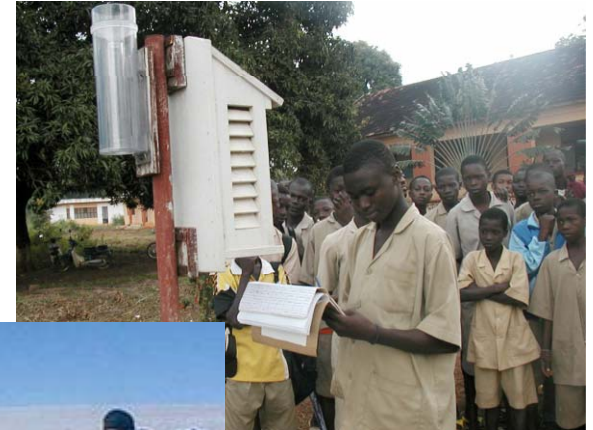
GLOBE has trained over 50,000 teachers representing more than 20,000 schools worldwide.

"GLOBE is the quintessentially ideal program for involving kids in science." Nobel Laureate Dr. Leon Lederman



The **GLOBE** Program

GLOBE Students Have Studied Their Local Environment for Many Years



Students have collected and submitted over 21 million data in order to better understand their local environment and the Earth system. How can teachers and students use these data in the classroom?

GLOBE Inquiry and Science Processes

Student Research Projects

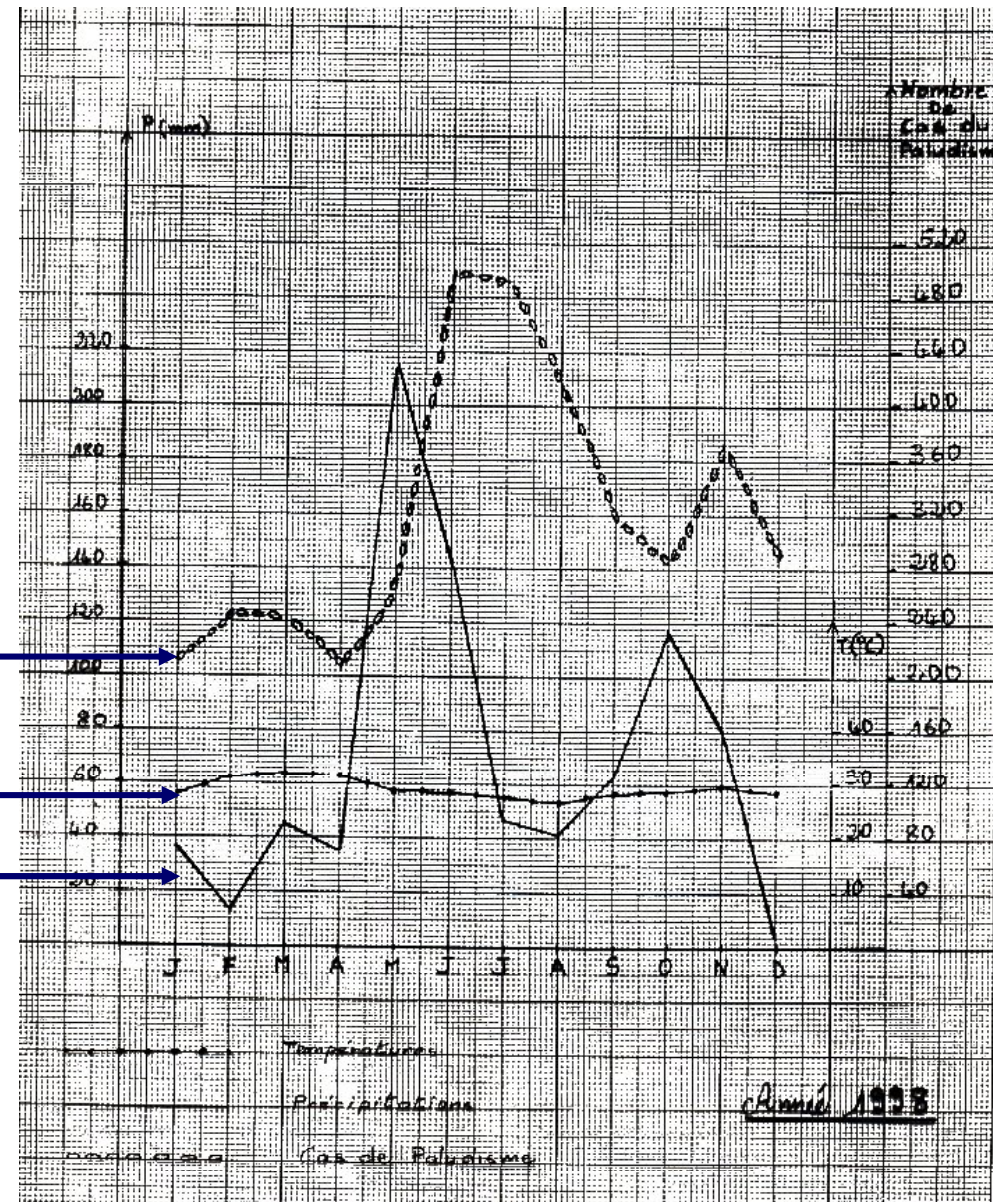
Students can look beyond GLOBE measurements and begin asking questions about their local environment.

This GLOBE school in Benin graphed cases of malaria in the community with temperature and precipitation.

Cases of Malaria

Temperature

Precipitation



This student research has since sparked a related Madagascar Malaria project and a Thailand Dengue Fever project

Why study Kilimanjaro?







Mt. Kilimanjaro



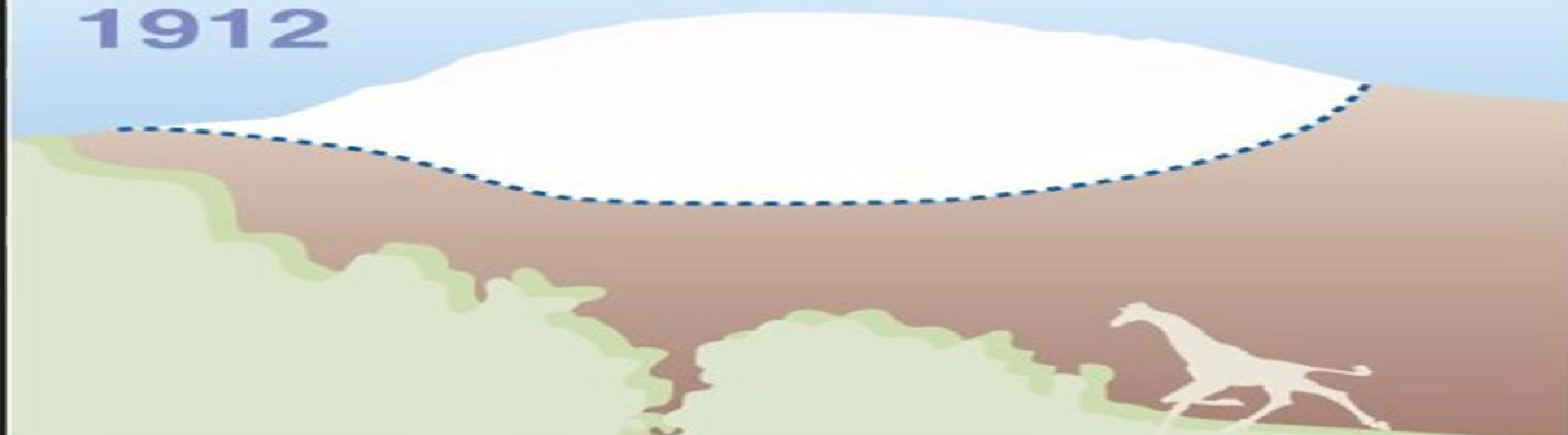
1970

2008



The Melting Snows of Kilimanjaro

1912



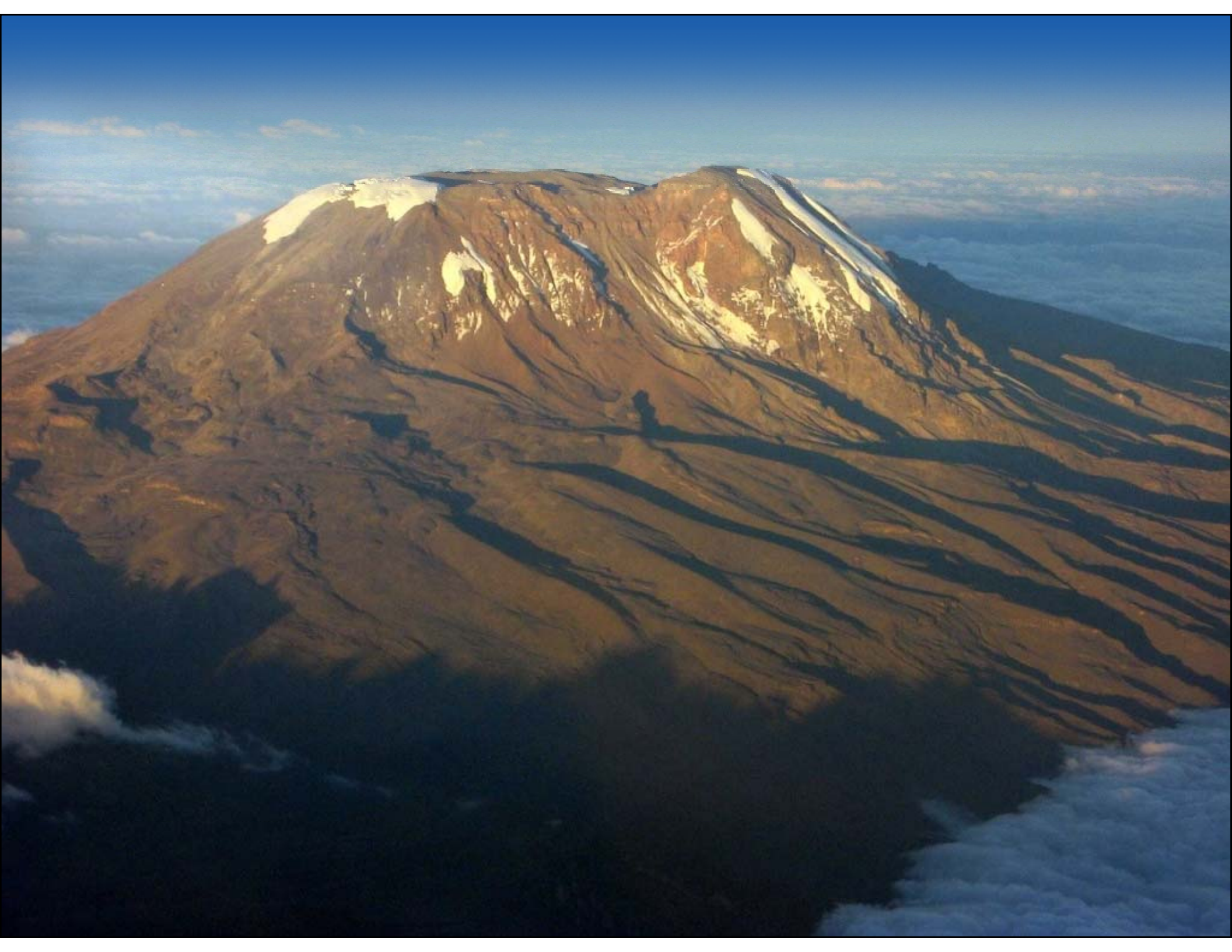
2002

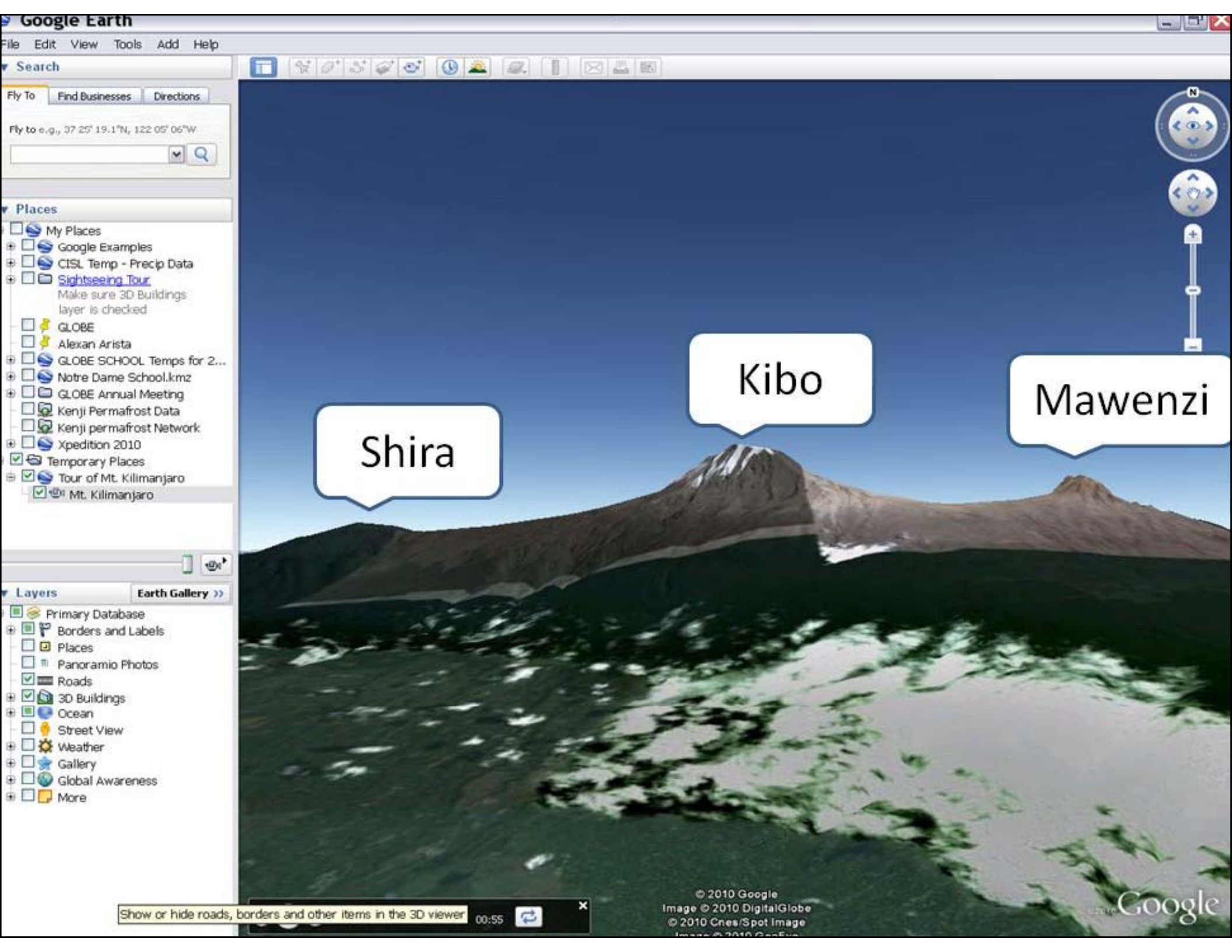


GRID
Arendal

DELPHINE DIGOUT
JUNE 2002

Sources: Meeting of the American Association for the Advancement of Science (AAAS), February 2001 ; Earthobservatory.nasa.gov.





Shira

Kibo

Mawenzi

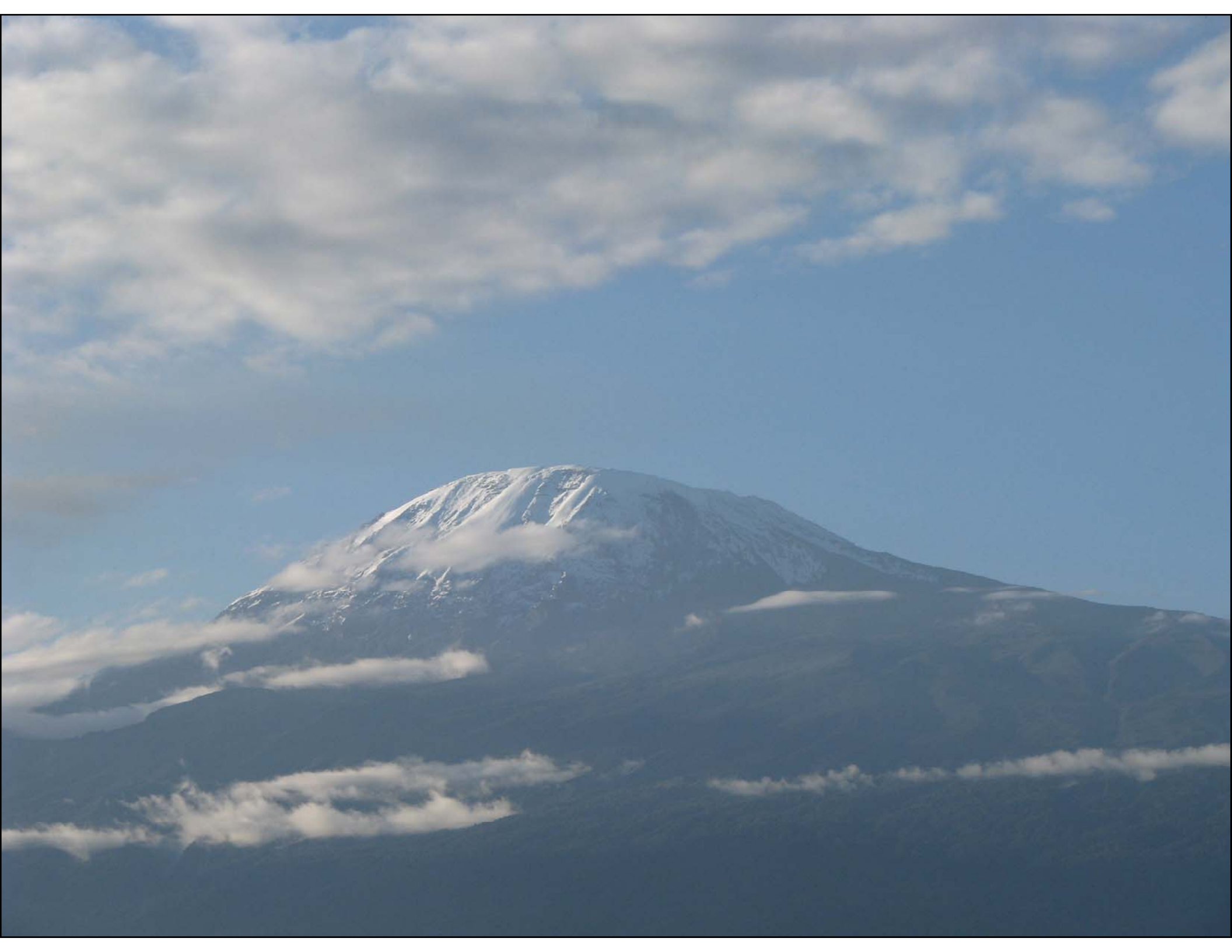
Show or hide roads, borders and other items in the 3D viewer

00:55



© 2010 Google
Image © 2010 DigitalGlobe
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Image © 2010 GeoEye

Google







The Xpedition



GLOBE Xpedition

Student Research Investigation
To the "Roof of Africa"
Mt. Kilimanjaro, Tanzania

[Learn More >](#)



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a GLOBE Africa
Seasons & Biomes
ESSP Project



GLOBE Africa



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Putting a face on the Xpedition

■

Students



Ntombikayise
Student Xpedition Member



Macaila
Student Xpedition Member



Emily
Student Xpedition Member



Sihle
Student Xpedition Member



Grant
Student Xpedition Member

Globe Alumni



Edward
Globe Alumni Member



Joseph
Globe Alumni Member



Mwasapi
Globe Alumni Member

- Mwasapi -



[Mwasapi's Bio](#)

[Return to Xpedition Members](#)

[Mwasapi's Sketches](#)

GLOBE Alum Mwasapi uses his artistic talents to further the Xpedition





by Mwasapi '09

- Participating Schools -

A Seasons & Biomes Project

While our Team of Students, Educators and Scientist are climbing the largest freestanding mountain in the world to gather environmental data within the distinct biomes of [Kilimanjaro](#) we invite you to take a look at the biomes of the participating schools below.

Click on the Schools below to view a description of their local biome

School	Teacher / Grade	Location	Country
Artion School	Tina Garst, 5th grade	Alabama	USA
Barberton High School	Russ Calvert	Ohio	USA
Brandenburg International School	Dr. Coverdale	Kleinmachnow	Germany
Brooklyn College	Jessica Scala	New York, New York	USA
CEG Avrankou Grade Level: 4-13	Bolariva Seidou (Principal GLOBE Teacher) Ylliass Lawani (GLOBE Alumni) Mansa G. Félix (geography teacher) Innocent d'Oliveria (Biology teacher and GLOBE Alumni) Principal: Emmanuel Souleimane	City: Avrankout	Benin Republic (West Africa)
Chamisa Elementary School	Adelaide Jacobson	White Rock, New Mexico	USA
Cherry Creek Elementary	Jim Kovach	Lowell, Michigan	USA

Sonoran Science Academy Elementary School - Tucson, Arizona

Biome Descriptions from Mrs. Cushing's 4th grade class

Kelynn: Our desert biome is very hot. We get little rain and we have dry land. We have many desert animals such as the Gila Monster, desert lizard, diamondback rattlesnakes, coyotes, scorpions, etc. We have different plants like the Teddy Bear cactus, Saguaro and Sonoran cactus.

Noah: Our desert biome is very hot and dry, but it gets cool during the winter. There are many types of wildlife such as lizards, mountain lions, scorpions, turtles and javalinas. There are lots of plants too, such as saguaros, Palo Verde trees, prickly pear cactus, and barrel cactus. A few animals I didn't mention are birds like the woodpecker and the hawk. The desert is a very interesting place that I hope to explore more when I am older.

RJ: Our desert biome is hot and dry. We live in the Sonoran Desert. Our animals are coyotes, javalena, tarantulas, scorpions, and many more. Our plants are Giant Saguaros, barrel cactus, ocotillos, etc. Our water sources are few. Our climate is hot and normally reaches above 100 degrees Fahrenheit in the summer months. It gets hot around 8:00am and starts to cool off around 4:00pm.

Hanna: It is very hot here. The desert biome has very little water. Saguaros are very popular here.

Calyssa: Our desert biome is very hot and dry. There are many cacti and lots of animals.

Gimnazjum nr 2 w ZSO nr 5 w Zabrze

Zabrze, Poland

Zabrze is located in the southern part of Poland, in the Central Europe, on the rivers Bytomka and Kłodnica, in the Odra river basin.

Our city is one of the Upper Silesian Industrial District. The main industries are coal mining and energy. The landscape here is strongly transformed by man - there are heaps, pits, and landslides, air and water are highly polluted.

Upper Silesia is one of the areas in Poland with the largest ecological threat. In recent years, the situation is improving thanks to many actions, the reclamation, establishment of modern filters on chimneys and building more sewage treatment plants. Many large industrial plants had been closed.

Poland belongs to the Palearctic Area. Our BIOM - TEMPERATE BROADLEAF AND MIXED FORESTS, is characterized by transitional climate between maritime and continental.

The weather depends on the incoming air masses. Due to prevailing westerly winds more air masses flow into our region are Maritime Polar Air masses.

The average annual temperature is about 8°C (46° Fahrenheit). The warmest month is July (average 17°C to 18°C, 64°F), while the coldest January (-2°C to -3°C, 27°F).

Crow Village Sam School Chuathbaluk, Alaska

Chuathbaluk is in the Taiga / Boreal forest Biome, on the Kuskokwim River in Southwest Alaska. We are on the edge of the tundra just upriver from the Yukon Kuskokwim Delta. We are mostly Yupik Eskimos. We subsistence hunt and fish. We go camping on hunting trips. We hunt for moose, bear, wolves, geese, caribou, beavers, ptarmigan, rabbits, ducks, swans, foxes, and porcupines. We use the furs for hats, mukluks (boots), guspuks (Eskimo jackets), mulihuks (hats), and dance hats and fans. We fish for salmon all summer long, and ice fish during the winter. We love to pick berries for akutaq (Eskimo ice cream). Winter is coming. We had our first frost on August 27th. Our birch trees are turning yellow now. Most of our other trees are spruce. It usually starts snowing in October. We usually have snow for Halloween, October 31. It gets down to -40 degrees Celsius in the winter. Our river usually freezes in November, and usually breaks up late April to early May.

Winter is our longest season. We love to play in the snow. We make snow angels, snowmen, igloos, tunnels, dens, and snow forts. Our favorite is having monstrous snowball fights in deep snow with our friends and family. We slide down hills, and drag each other on sleds with Honda ATV's and snowmachines. The ice on our river gets thick enough for us to travel on with snowmachines, trucks, and dog sleds to other places. The most beautiful thing about Chuathbaluk is that we get to see the colors of the northern lights dancing in the sky above our snow-covered mountains.

Benin Republic: West African Continent.

LATITUDE : 6.55 deg North

LONGITUDE : 2.65 deg East

ELEVATION: 52 m

Avrankou's dominant plant is the palm tree. This is an introduced plant. Therefore there are other co-dominant plant species such as acacia and banana.

The animal species most observed is pigs.

Other important observations made geography or climate related are below :

RELIEF; shelf

CLIMATE, four seasons (two rainy seasons and two dry) as follows:

- . A LONG RAINY SEASON which lasts from April to July**
- . A SHORT DRY SEASON which lasts from August to September**
- . A SHORT RAINY SEASON which runs from October to November**
- . A LONG DRY SEASON which lasts from December to March**

We now observe that these four seasons (that our parents have known) have disappeared, giving way to two main seasons, namely a long rainy season and dry season which dates and times are very disparate in time. For example, currently the country is under water. It is raining heavily and everywhere in the country there is flood. But there is still no flood at Avrankou, certainly related to our level of elevation relative to the sea.

Xpedition Students gather each night to answer e-mails and work on their research questions







Questions

From: Anteneh Habtesilassie - Lucy Academy Audis Ababa, Ethiopia

Hello I saw beautiful yellow flowers on the page and I wonder the similarity with the Ethiopian yellowy endogenous flowers growing only in September can you tell us about the flowers and their indignity? The flower is On the mountain we call this Kiwaro, this is a mountain name for the flower and it only grows in the rainforest during the rainy season. **Julius / Kilimanjaro Head Mountain Guide**

The botanical name for this flower is Bidens Kilimandsharica and it is only found on the slopes of Kilimanjaro. The flower you speak of may be related if it is found in a similar elevation zone and in a rainforest setting. **Dr. Kenji Narita / Xpedition Faculty Member.**

From: Valdez High School, Valdez, Alaska


How can Africa have snow when it is so close to the Equator?

Africa can have snow even when it is right on the equator on the top of Mt Kilimanjaro where the temperatures get really cold, the clouds form and get heavy and precipitation in the form of snow occurs, because of the high elevation. Changes in elevation influences seasonal patterns and can affect the environment as much as changes in latitude. For every 150 meter increase in elevation, the temperature decreases about 1 degree C. **Dr. Sparrows / Xpedition Base Camp Member**



19,672 web visits from
98 countries, 917 cities
in 10 days while on the
mountain

Over 130 collected data
/ observations using
GLOBE protocols, data
posted via Google
Earth on the Xpedition
web site





Over 700 questions
were emailed to Base
Camp, 108 were
answered from the
mountain



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MOUNT. KILIMENJARO



Adam

If you notice
that the climate
change is effecting
Mt. Kilimanjaro.

If you look
at pictures
from the 1900's
there is much
more snow
and glaciers
then now



Noun

Climate Change
is the worst threat
to Mt. Kilimanjaro
It has seen retreat
of glaciers and the
ice cap volume is
dropping by more
than 80%. To some
scientists beliefs, they
don't know that it's
because of Global
Warming.

There are 364 species
of animals in Africa
including: the blue
monkey, olive baboon,
civet, meerkat, serval,
bush pig, honey badger,
hartebeest, kudu, African
lion, elephant, dugong,
senegal bushbaby, brown
greater galago, mottled
guinea, giant pangolin
(ant eater), false killer
whale, hippo, puku,
Burghills zebra, mountain
reindeer and much more!



Plants

Plants
Even though I don't know
how many species of
plants are in Africa I do
know some of them like:
the Acacia, Geraniol, Eucalyptus,
Bermuda Grass, Candelabra
Tree Gum Tree, Eucalyptus,
Jackalberry Tree, Karroo
Tree, Kangaroo Paw,
Manketti Tree, River
Bushwillow, Umbrella Thorn,
Acia and the Whistling Thorn.
Plants

Cross?
Word?
Puzzle?



The Science





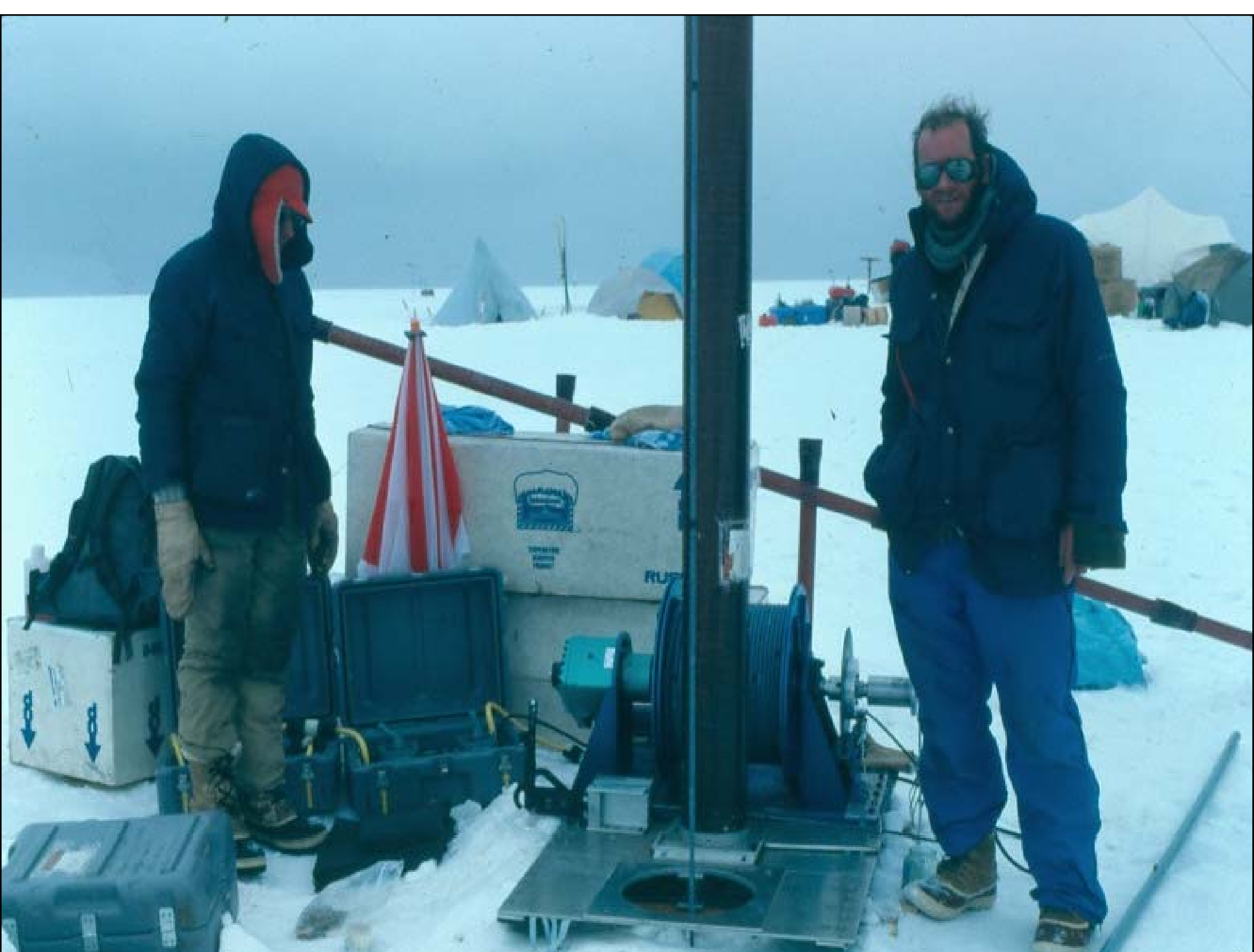
CONGRATULATIONS
YOU ARE NOW AT

KILIMANGJARO PEAK, TANZANIA, 5895M. AMSL.

AFRICA'S HIGHEST POINT
WORLD'S HIGHEST FREE-STANDING MOUNTAIN

ONE OF WORLD'S LARGEST VOLCANOES.
WELCOME



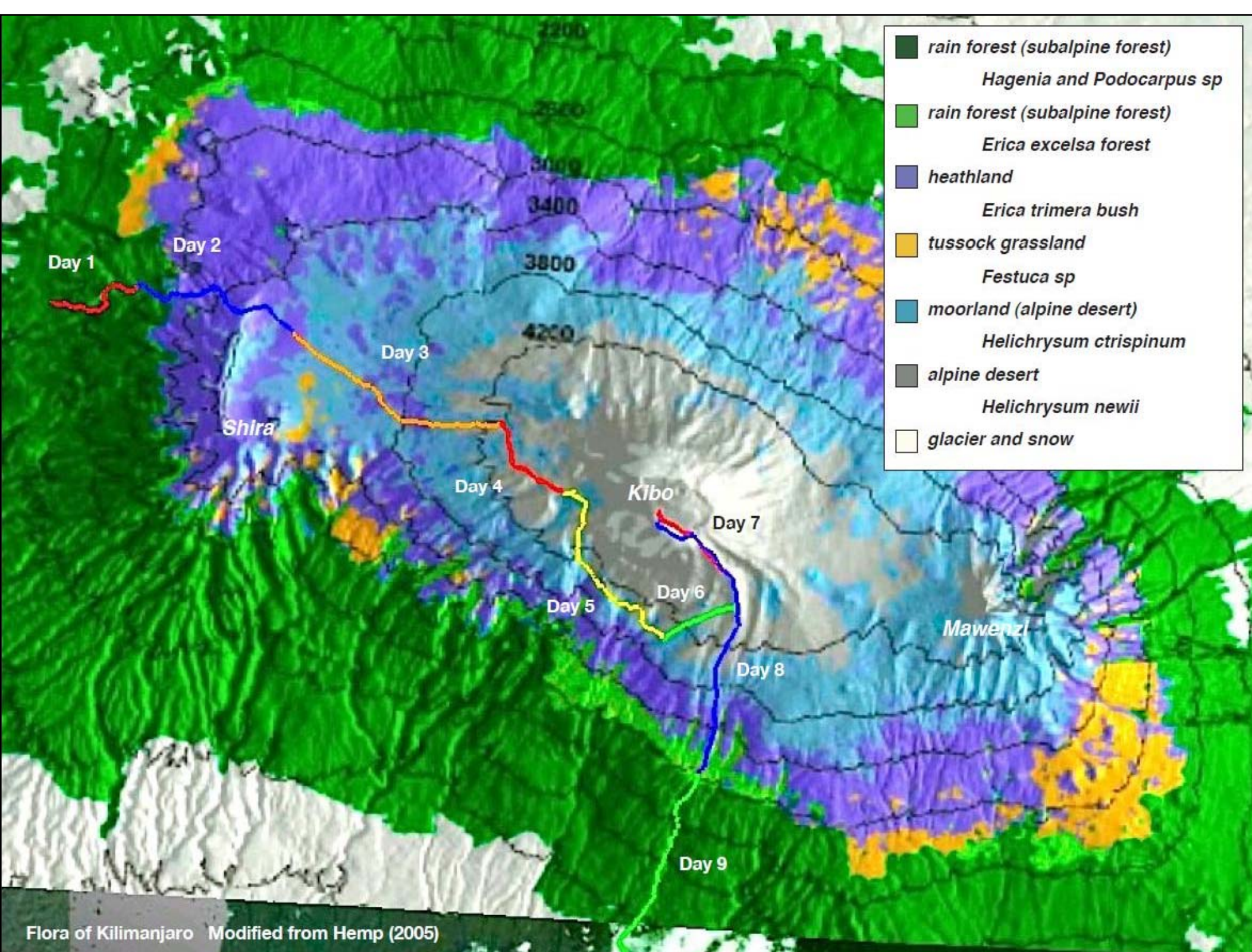






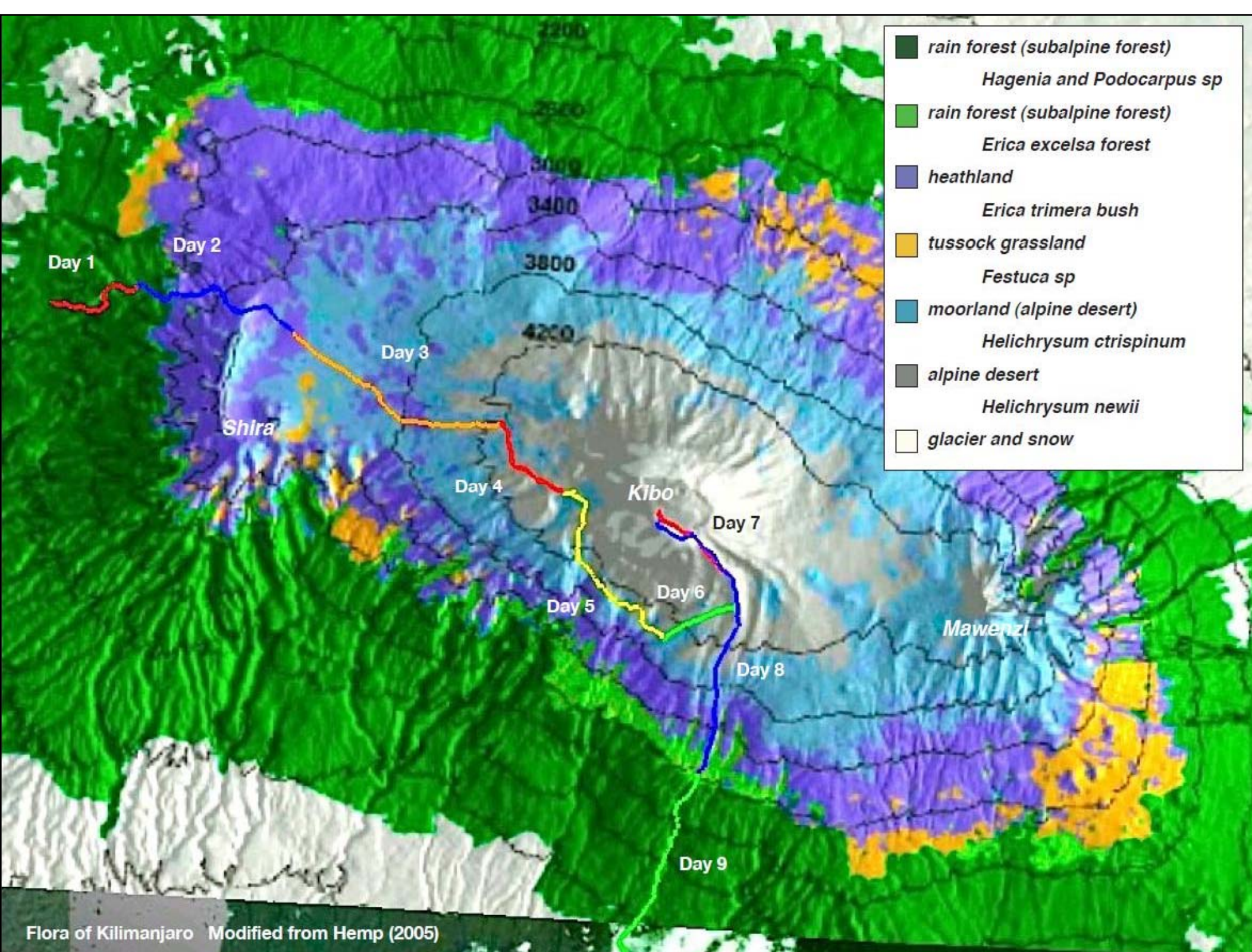






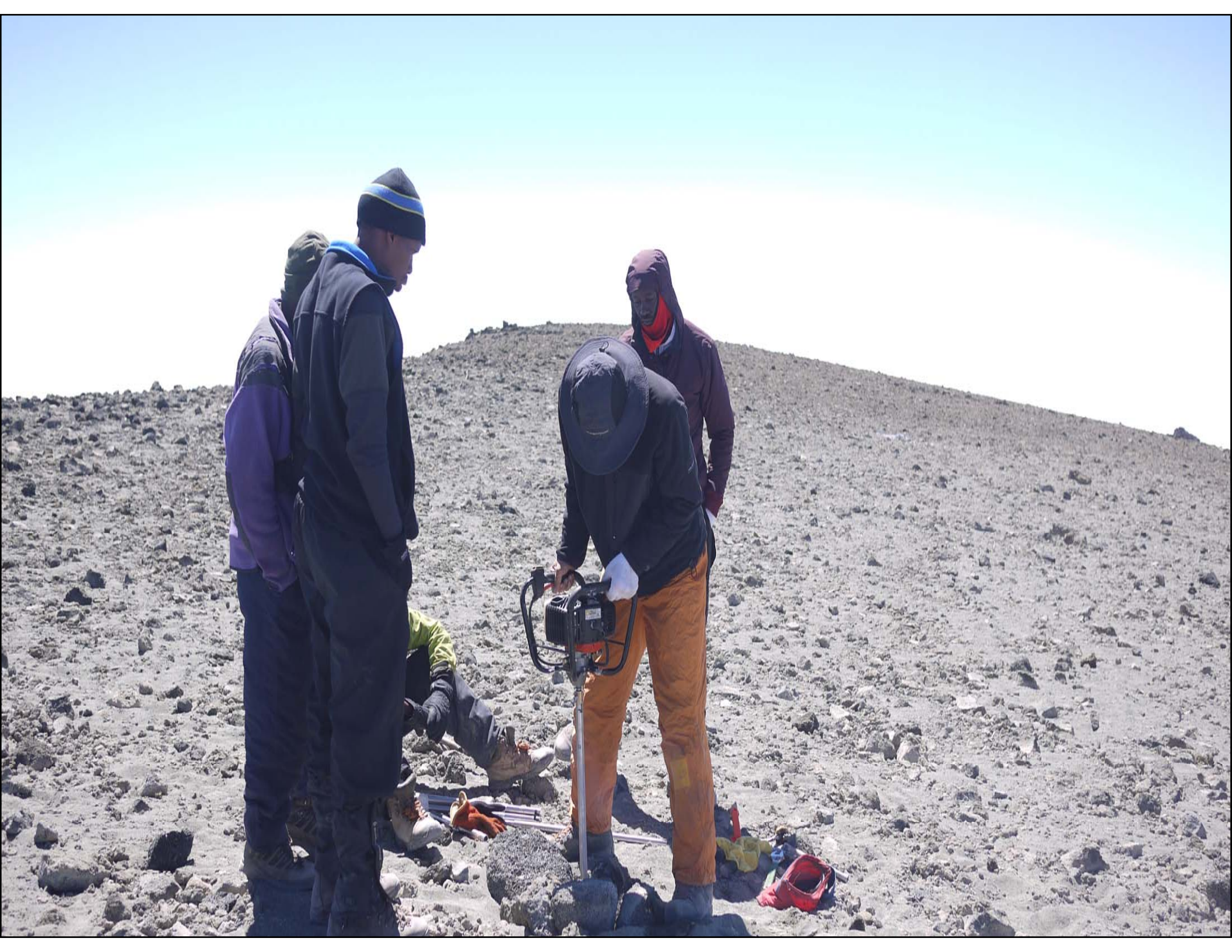














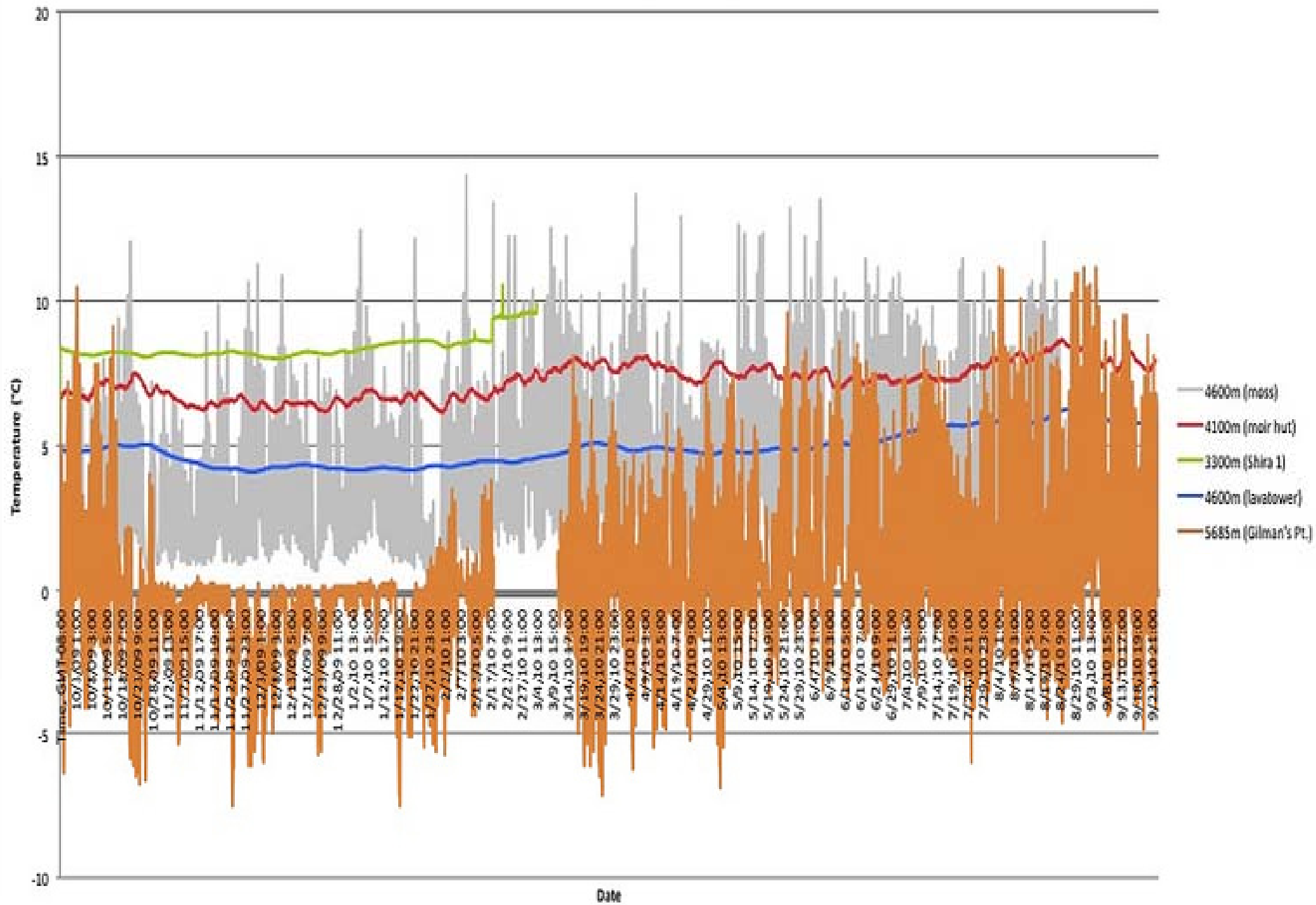




View all collected GLOBE Protocol Data in Google Earth on the Xpedition Journal Page



Ground temperature (°C)



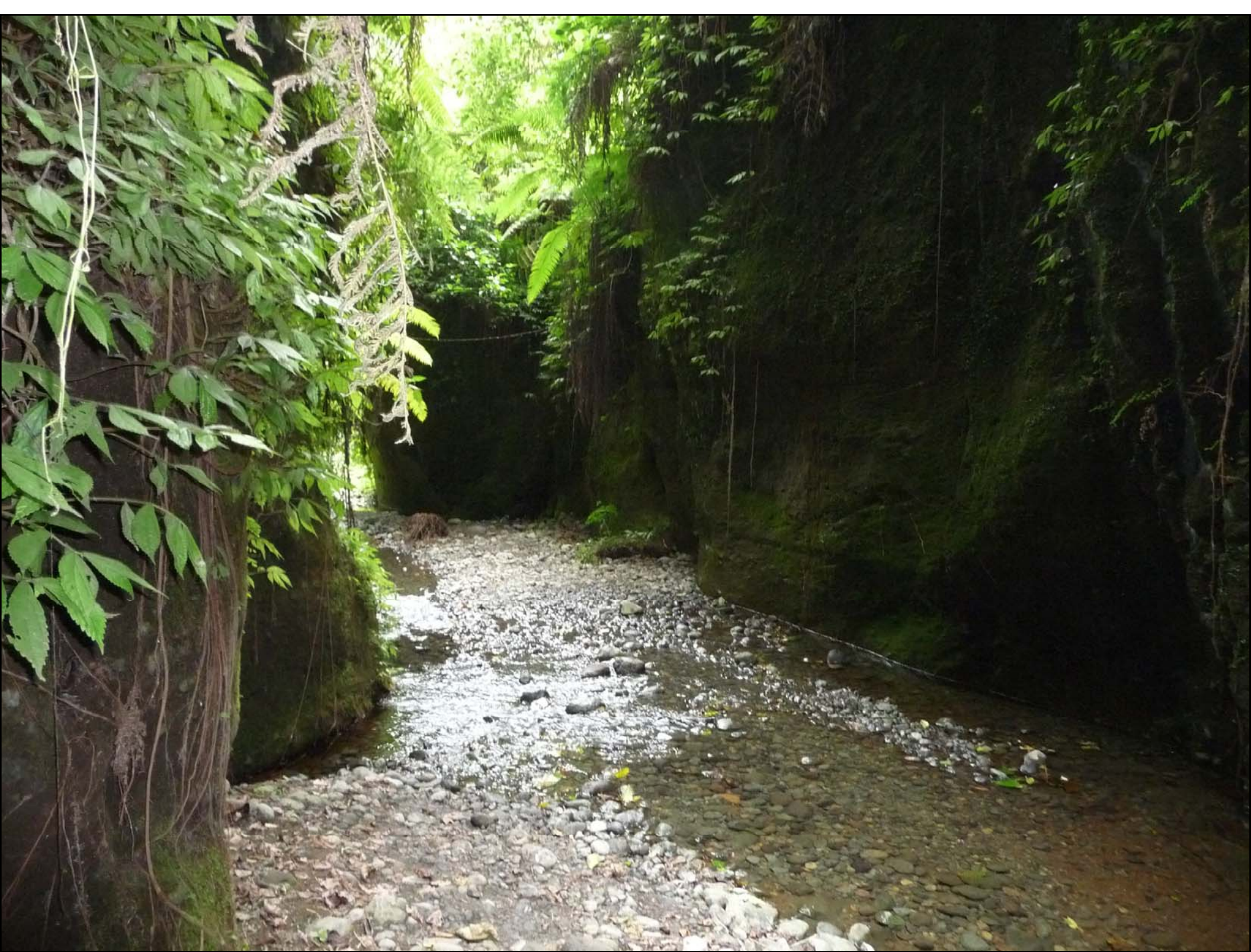


Basecamp

Arusha, Tanzania







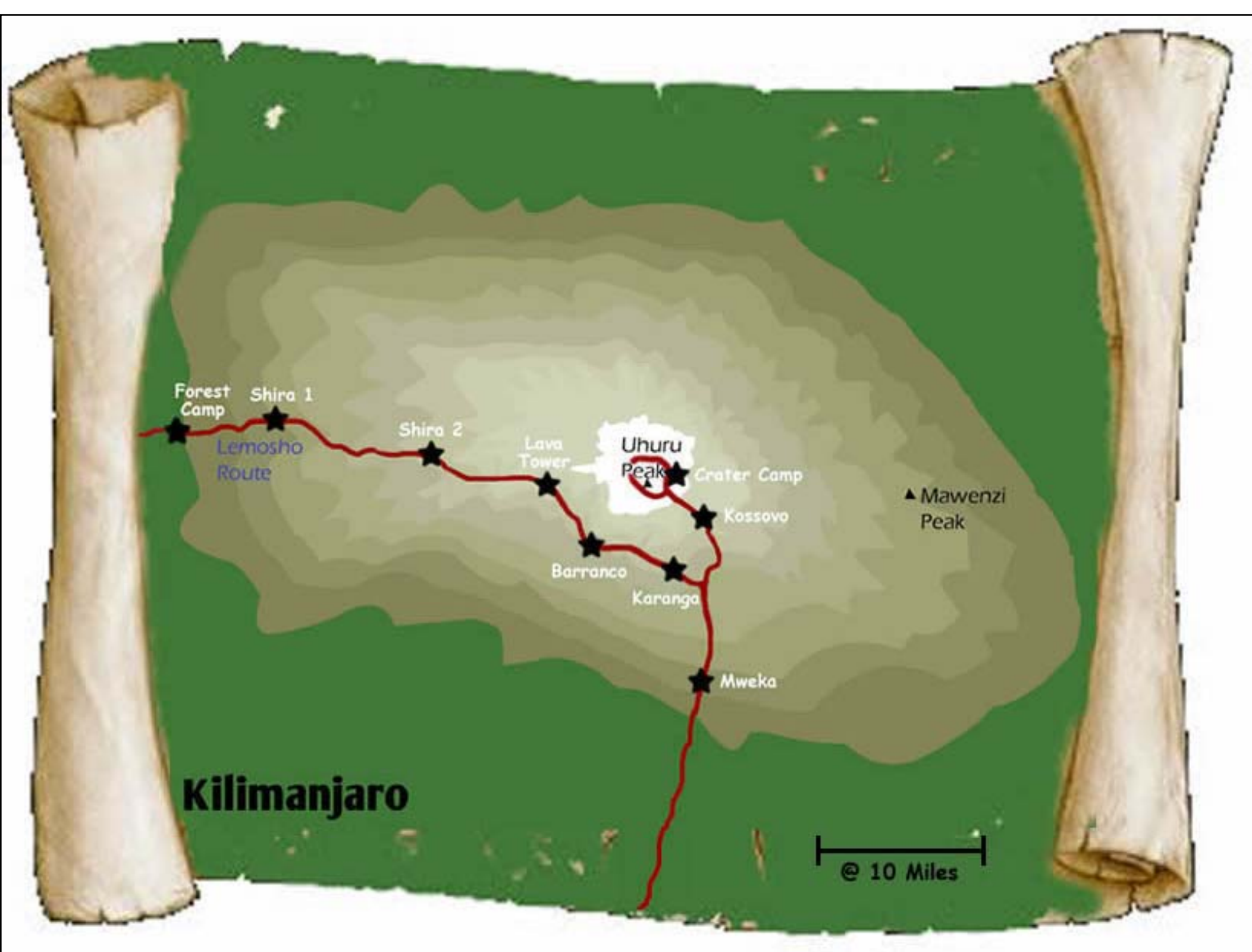








the Climb













Cultivated Land

792 to 1,830 meters
2,600 to 6,000 feet













Oral Traditions – White Ash



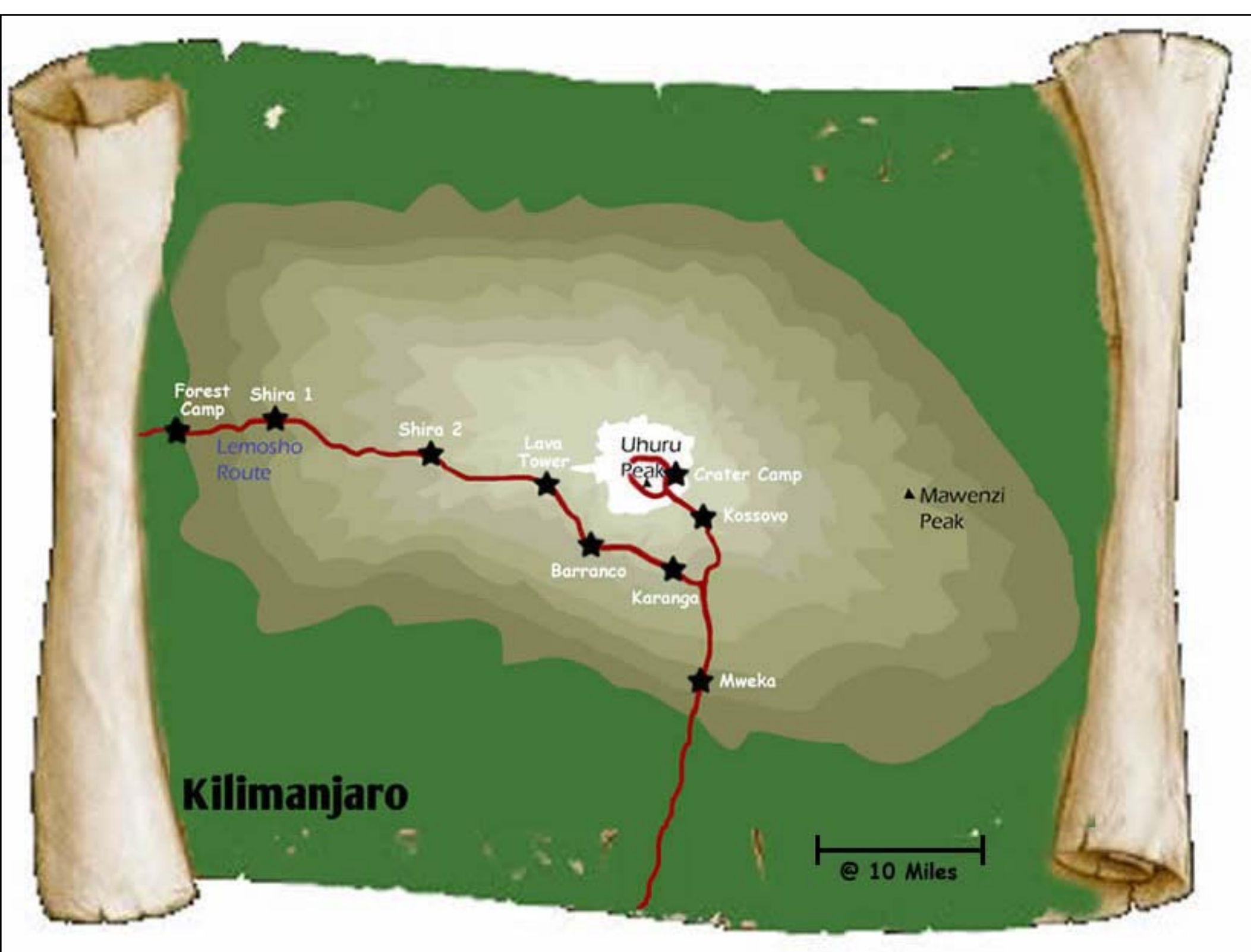


Rainforest

1,830 to 2,804 meters
6,000 to 9,200 feet







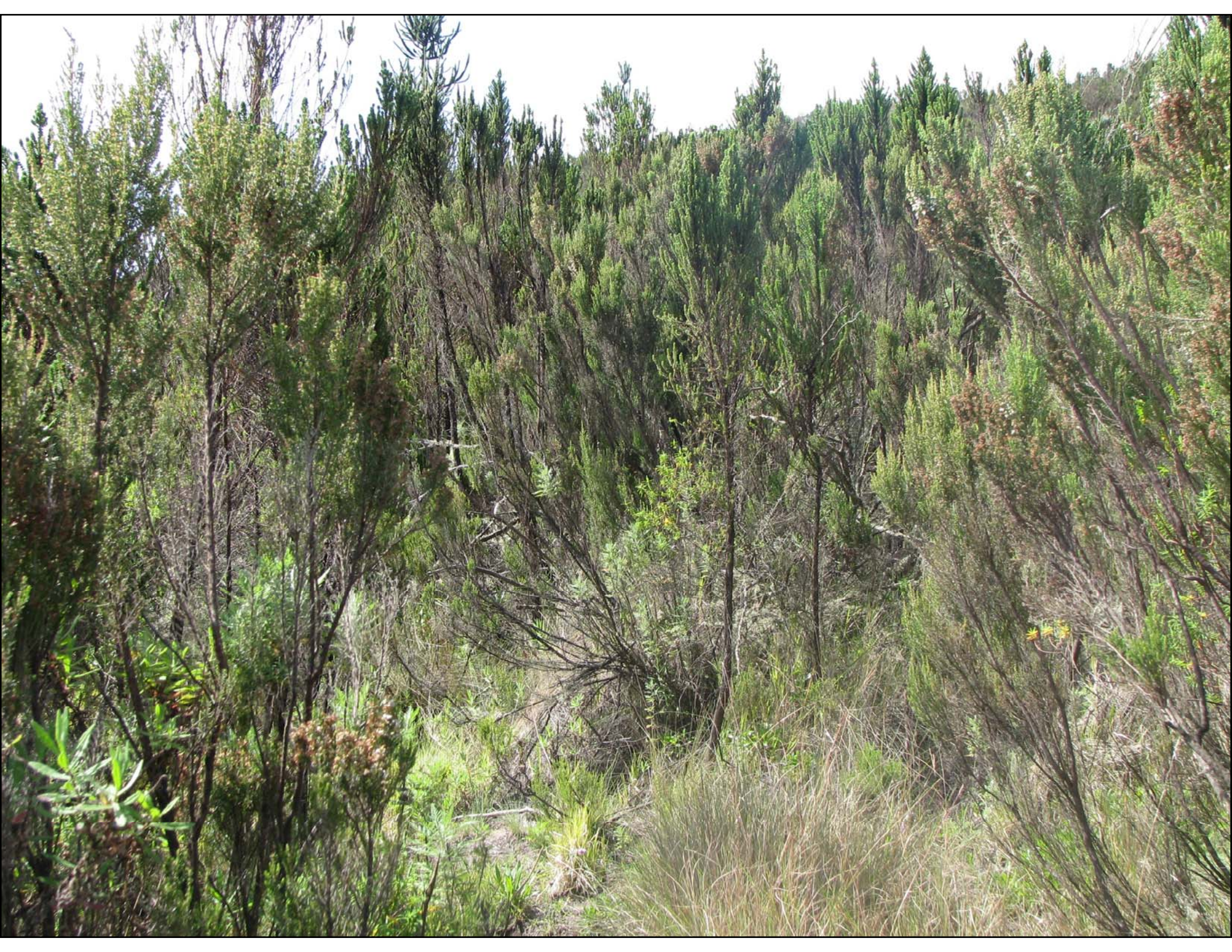






Heath Zone

2,804 to 3,353 meters
9,200 to 11,000 feet









Moorland

3,353 to 4,023 meters
11,000 to 13,200 feet









Alpine Desert

4,023 to 5,029 meters
13,200 to 16,500 feet













Summit

5,029 to 5,895 meters
16,500 to 19,340 feet













High Resolution Panoramic Pictures









**View of Furtwangler Glacier from Uhuru
Peak, Summit of Kilimanjaro, October 2009**



Change in the size of the Furtwangler Glacier over the last 20 years



June 2008



October 2009



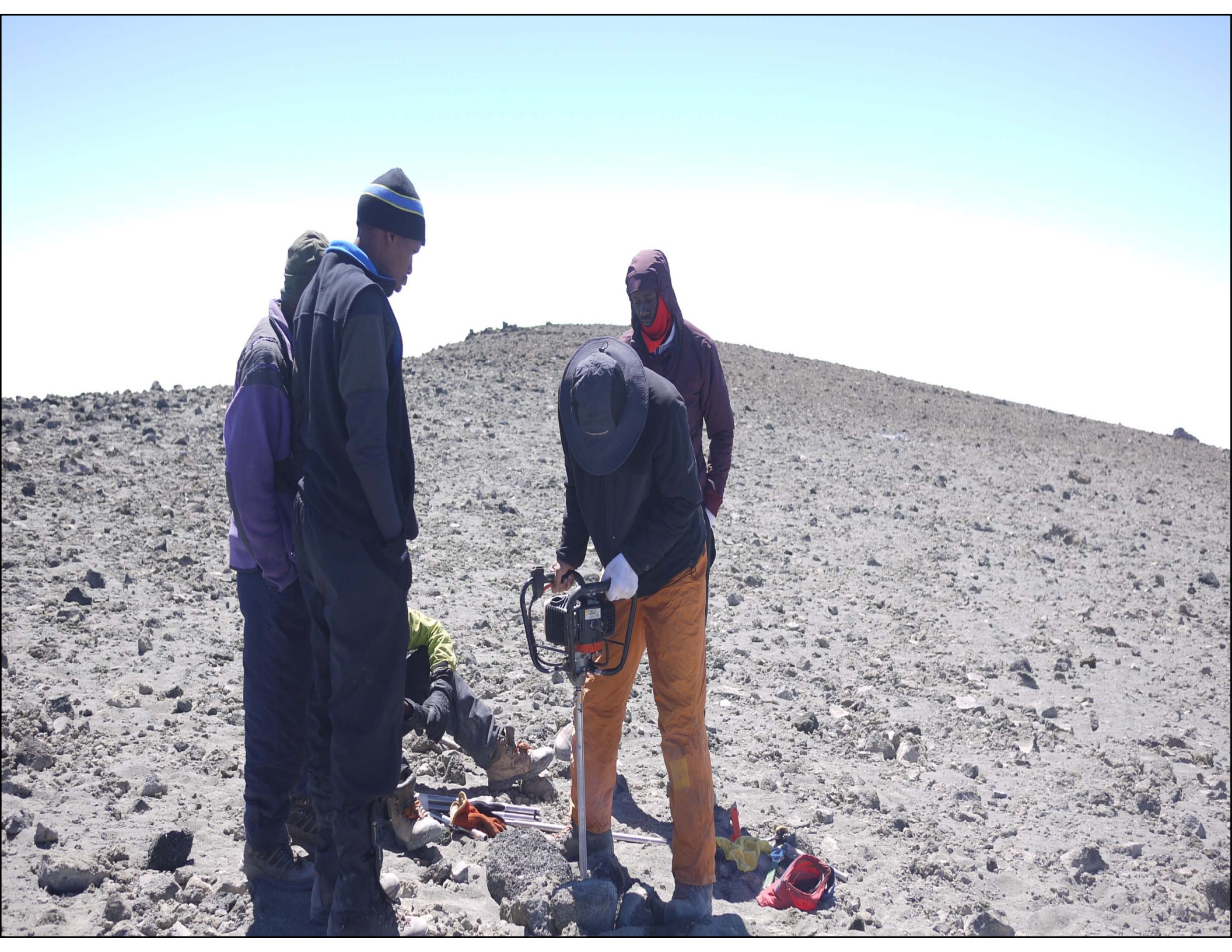
October 2010





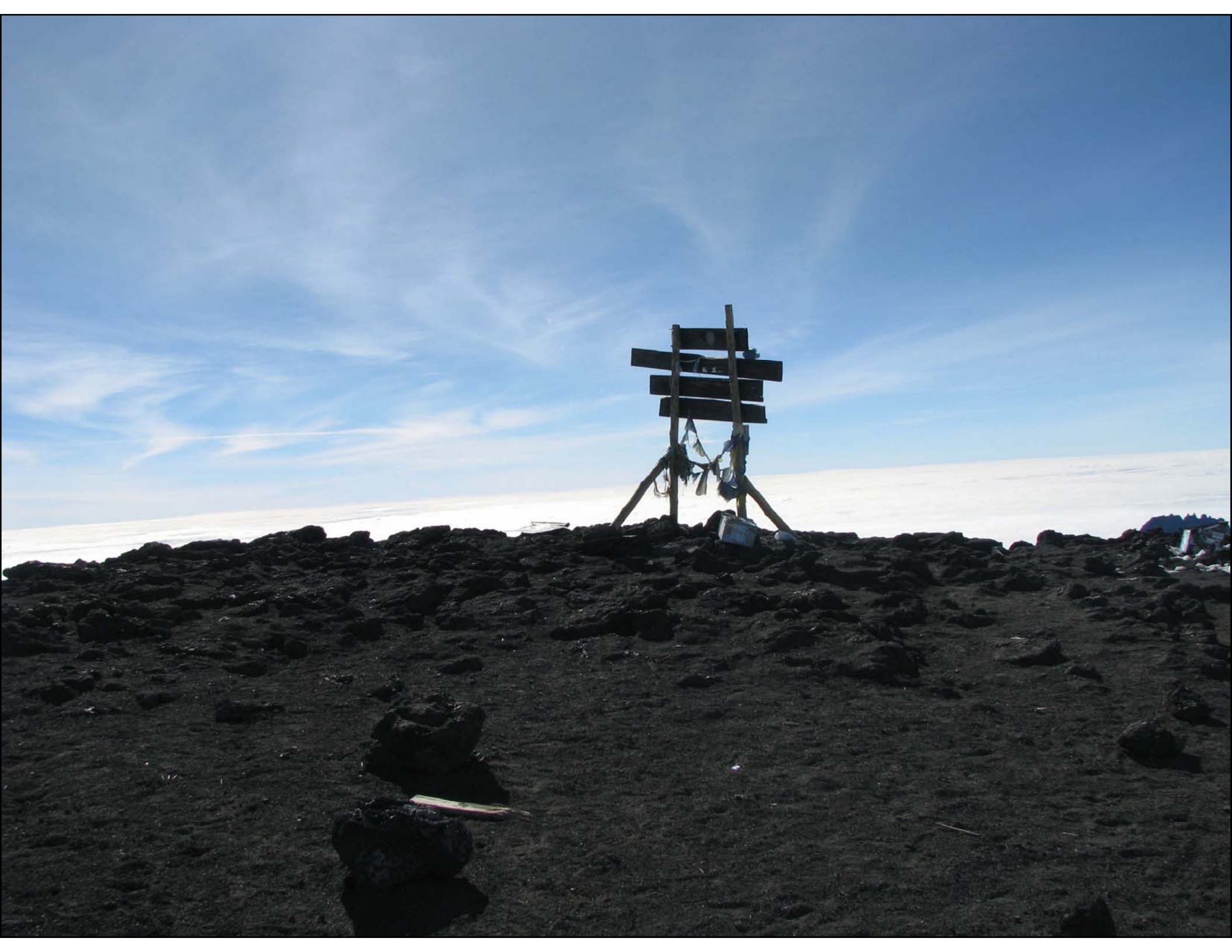
Dr. Kenji and team collect data, continue to drill near Crater Camp















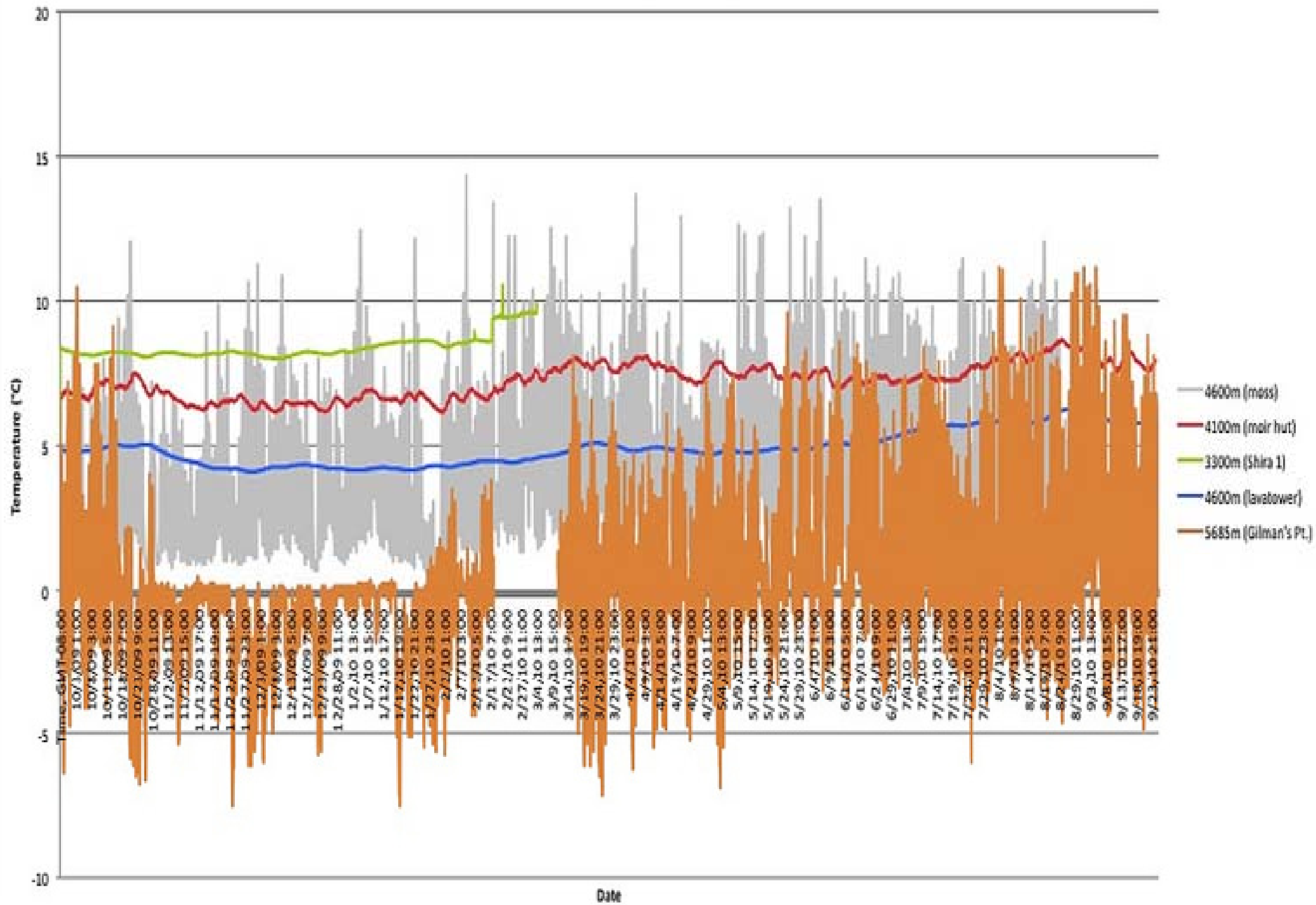


**“Top of the World,
A Dream Come True,
Thank You GLOBE”**

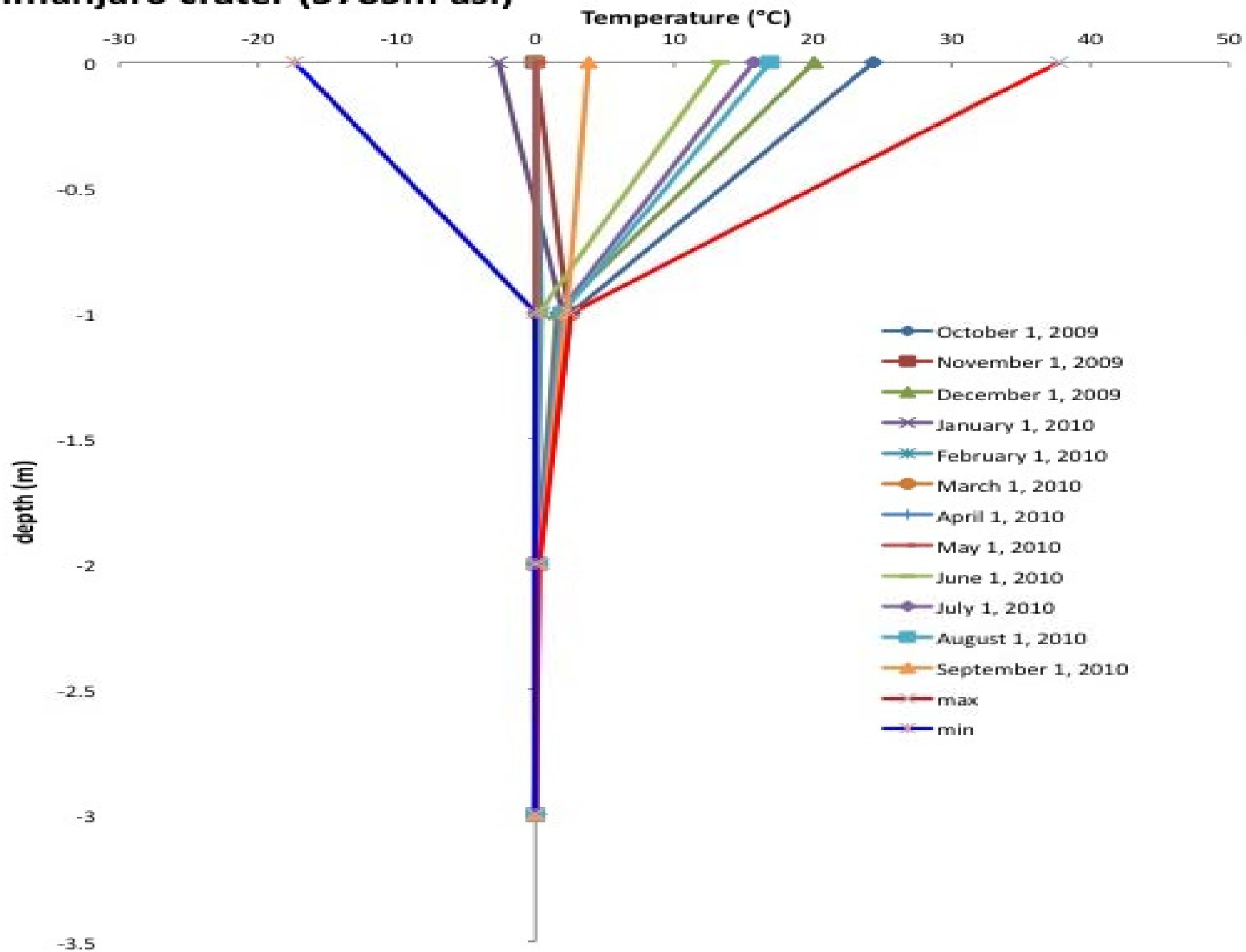




Ground temperature (°C)



Kilimanjaro crater (5785m asl)





What We Discovered

- Permafrost is found at 5700m on Kibo
- Underground thermal heating is not contributing to the melting of the glaciers
- Changing weather patterns are responsible for changing precipitation amounts on the mountain and many biomes are being affected
- Water chemistry results from mtn. streams/glacier hope to reveal the source(s) of the water which is used for drinking water and agriculture
- More research is needed to study other human impacts on the mountain (human waste)